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BOOK REVIEWS

The Judgment of Very Weak Sensory Stimuli with Special Reference to the Absolute Threshold of Sensation for Common Salt. By WARNER BROWN. University of California Publications in Psychology. Vol. I, No, 3, 1914. Pp. 199-268, pls. 1-4.

Although the term absolute threshold of sensation is found very frequently in the literature of psychophysics, Dr. Brown finds that the concrete experiences on which this notion is founded have received little consideration. In a former paper, the author made an analysis of the experiences that underlie the determination of the difference threshold. (The Judgment of Difference. Univ. of California Pub. I, No. I, 1910.) He feels, however, that the two cases are different inasmuch as at least one factor—the attitude of the subject-changes. In the case of the judgment of difference, the subject has two easy categories of greater or less which he can fall into, but in the judgment of the presence of a stimulus no such categories exist.

The author applied a salt stimulus and used two series of solutions; one containing degrees of salt from 0%-1.5% in steps of 0.1%; and the other varying from 0%-0.35% in steps of 0.025%. These stimuli were contained in bottles which were closed with a pipette, which latter would hold 1 cc., the amount always used for stimulation. The stimuli were presented in a chance order. Two groups of subjects were used. Each of eight subjects were given 40 series of the strong stimuli. These subjects were untrained in psychological procedure, they "were doing their first work in experimental psychology" (p. 210). The second group of subjects were four in number and these were more highly trained. On these the weak series of stimuli were applied in certain cases. In all, something over 10,000 judgments form the basis for the discussion.

Brown finds, as the result of certain series in which he recorded the order of presentation of the stimuli, that this order has an effect upon the judgments which will be given. This is conceived by the author as being due to subjective or "central" factors. "The central factors may be thought of as the condition of the organism itself modifying its reaction." Differences in reaction from time to time "may be thought of as due to the different condition of the organism" (p. 218). In the case of three observers, there was a tendency to reverse the preceding judgment. Brown also discovers the very interesting fact that the amount of difference between the stimuli themselves has an influence on the judgment. Thus the relative frequency of judgment on stimuli of the same intensity differed considerably when they occurred in the strong or the weak series. Hence the threshold was changed to a considerable extent.

But the main thesis of the paper is an interpretation of the threshold of sensation. Brown believes that the fact that a stimulus may be perceived in 50 or 75 *per cent.* of the cases depends upon too many irrelevant factors to make the determination of any value. In place of this concept of the threshold, the author suggests the following: When he plots the rough polygons of his "salt" judgments, he finds that with the lowest intensities, the curve at first rises slowly, and

then more rapidly, and later more slowly with the stronger stimuli. Hence the steps in the middle of the polygon will be relatively higher than those at either end. "In such a graphic representation one step in the middle of the curve is higher than any of the others and marks the point where the curve changes from concave to convex." "Once it (this greatest step) has been discovered, it proves to be an admirable substitute for the conventional threshold." "This point can be defined precisely and has exactly the same significance for every person and for every kind of stimulus. It corresponds to the intensity of the stimulus from which a change of a given amount will be most frequently or easily recognized" (242 f). It is found furthermore, that this threshold falls very close to the old 0.5 threshold.

It would seem to the reviewer that Brown has not rid himself of the old notion that the threshold is an absolute value of almost mystical significance. The threshold has come to be recognized as a mere arbitrarily chosen probability, and as such it is open to variation due to all sorts of objective and subjective influences. All that can be claimed for a threshold value is, that it is the intensity of stimulus on which we may expect to obtain a certain judgment with a probability of 0.5 *under our given experimental conditions.* Brown has himself merely pointed out another of these conditions—the size of the steps between the stimuli. The factor of the effect of the order of presentation of the stimuli has been in the literature for a long time. Brown apparently fails to notice that the curves which he has plotted are merely the rough polygons from which we may construct the curve of the psychometric functions for the greater judgments. Such a curve has approximately the form which Brown describes, except for the one very significant fact that the central portion of this curve may be described as a straight line, or, in other words, there is no sharp change from concavity to convexity. Hence the localization of this point is even less definite than Brown would have us believe. A consideration of his own curves bears out this point. Inasmuch as we recognize that the threshold value is a mere probability, it would seem to be advisable to determine this as accurately as possible. The methods of calculation give the most probable value of this probability and Brown's method cannot attempt to even approximate this. Brown himself admits that the threhold, as ascertained by his method, lies very close to the 0.5 value. It would seem deplorable to substitute a less accurate measure for a more accurate one, when they give approximately the same value of intensity.

The reviewer does not believe that Brown's differentiation of the processes of judgment employed in obtaining the difference and stimulus threshold is valid,—not at least on the basis of his arguments. Brown states that in the judgment of difference the subject has the two easy categories of greater or less, while in the judgment of the mere presence of a stimulus no two categories exist. The reviewer believes that, for the obtaining of the stimulus threshold, there is very good introspective evidence that two such categories do exist—in the case of the present experiment these would be "salt" and "not salt." This of course may seem to be only a logical differentiation, but the reviewer believes that it is substantiated by introspective experience. Hence it would seem that there is no need of differentiating between the difference and stimulus thresholds.

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